

# “GIS Viewer Solutions for an Indiana Harbor Redevelopment Project”

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**2008 Indiana GIS  
Conference**

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# ***“GIS Viewer Solutions for an Indiana Harbor Redevelopment Project”***

- Redevelopment Project in Lake Co. performed by The Community Builders/Lakefront Revitalization
- Project Objective--remove obstacles to lake shore access, and link the local community to Lake Michigan
- AMEC --Develop a GIS database, base map, and viewer to assist in project planning and visualization of data for use by the non-GIS proficient team members
- Evaluated viewers based on a variety of criteria
- Viewing options: ArcReader, ArcExplorer, AccuGlobe, ArcMap+Google Earth, and a custom website



# GIS Benefits to the Project

- Geography Brings Together Widely Disparate Disciplines
- Helps Us See the “Big Picture”
- Cost Savings--Operational Efficiencies
- Better Data Management--More Efficient Storage and Updating
- Facilitates Better Decisions
- Faster Information Access
- Promotes Data Sharing
- Enhances Communication





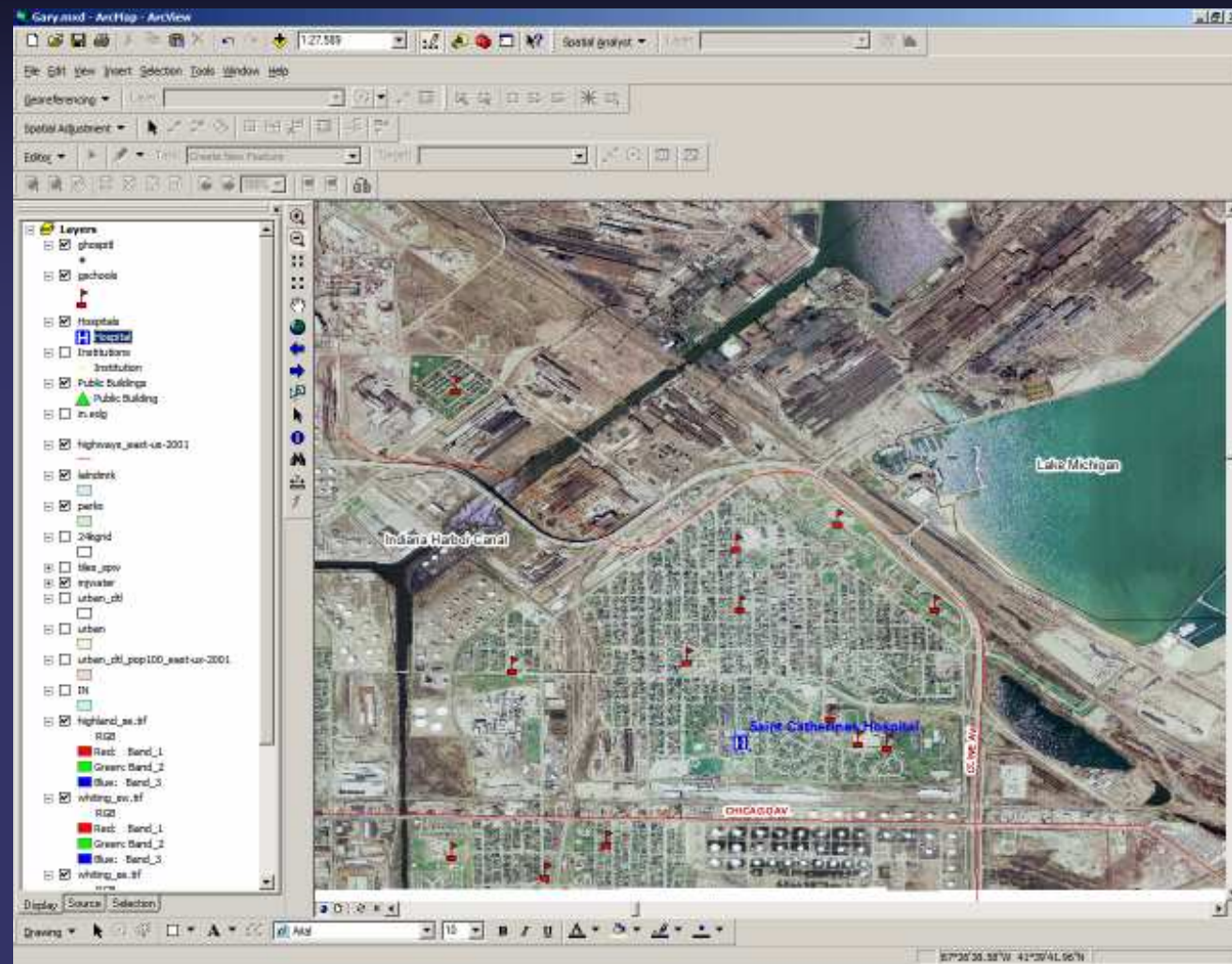
# Sources of Existing Data:

- The City of East Chicago
- Indiana Spatial Portal
- Gary Sanitary District
- Northwest Indiana GIS Forum
- Lake County Surveyor
- USEPA Region 5
- Indiana Geological Survey, Lake Rim GIS
- IDEM
- ESRI



# Base Map-Created in ArcView 9.2

- Environmental
- Infrastructure
  - Parcels
  - Structures
  - Utilities
  - Transportation
  - Parks & Recreation
- Boundary
- Topo & Landscape
- Project-Specific
- Demographics
- Orthos



*All layers projected to IN State Plane West, NAD83; in ERSI File geodatabase format*



# ArcView Base Map (points)

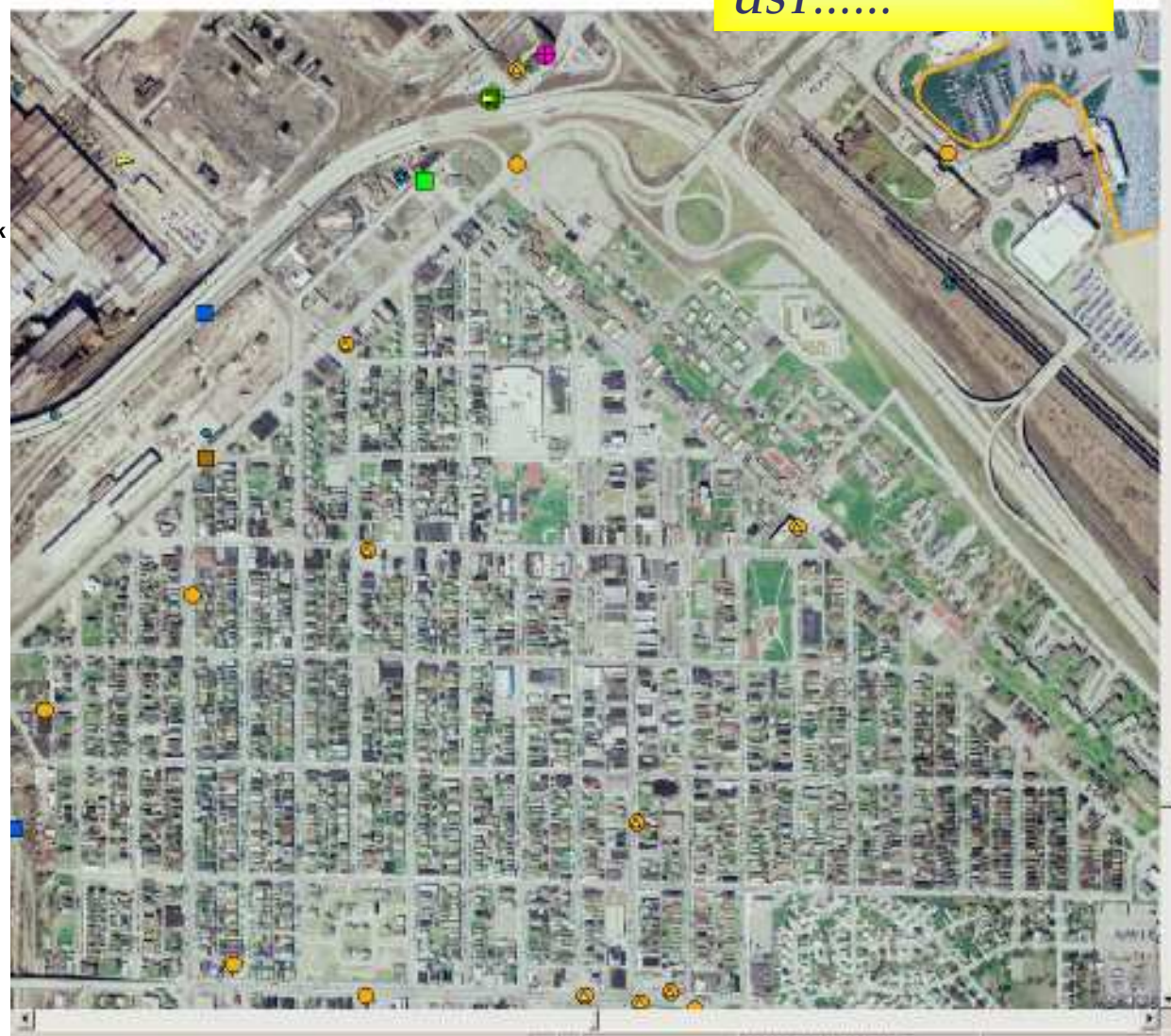
NPDES....

RCRA.....

UST.....

## ENVIRONMENTAL

- RCRA Wells
- NPDES Pipes
- ▶ Spill
- + CSO Site
- Permitted Site
- ▲ Leaking Underground Storage Tanks
- Underground Storage Tank
- Open Dumps
- + Construction Demolition Waste
- ◀◀ Waste Transfer Stations
- ✱ Water Quality Site
- ◆ Solid Waste Sites
- Brownfield
- NPDES Facilities
- EPA Monitored Site
- Waste/Treatment/Storage/Diposal Site
- ⊕ Corrective Action Site
- ⬠ WWTP
- ▲ Refinery
- + Toxic Release Inventory
- Superfund Sites
- Waste Tire Sites
- ◀◀◀ Water Intake
- Voluntary Cleanup Site





# ArcView Base Map (lines)



## INFRASTRUCTURE/UTILITIES

-  EC\_Water Valve
-  EC\_Sewer Point
-  EC\_Water Line
-  EC\_Sewer Line
-  EC\_Fire Hydrant
-  Gary\_Water Valves
-  Gary\_Water Main
-  Gary\_Fire Hydrant Lead
-  Gary\_Fire Hydrant
-  Towers Cellular
-  Interconnect
-  City Fiber
-  Conduit
-  Pipeline
















Water....

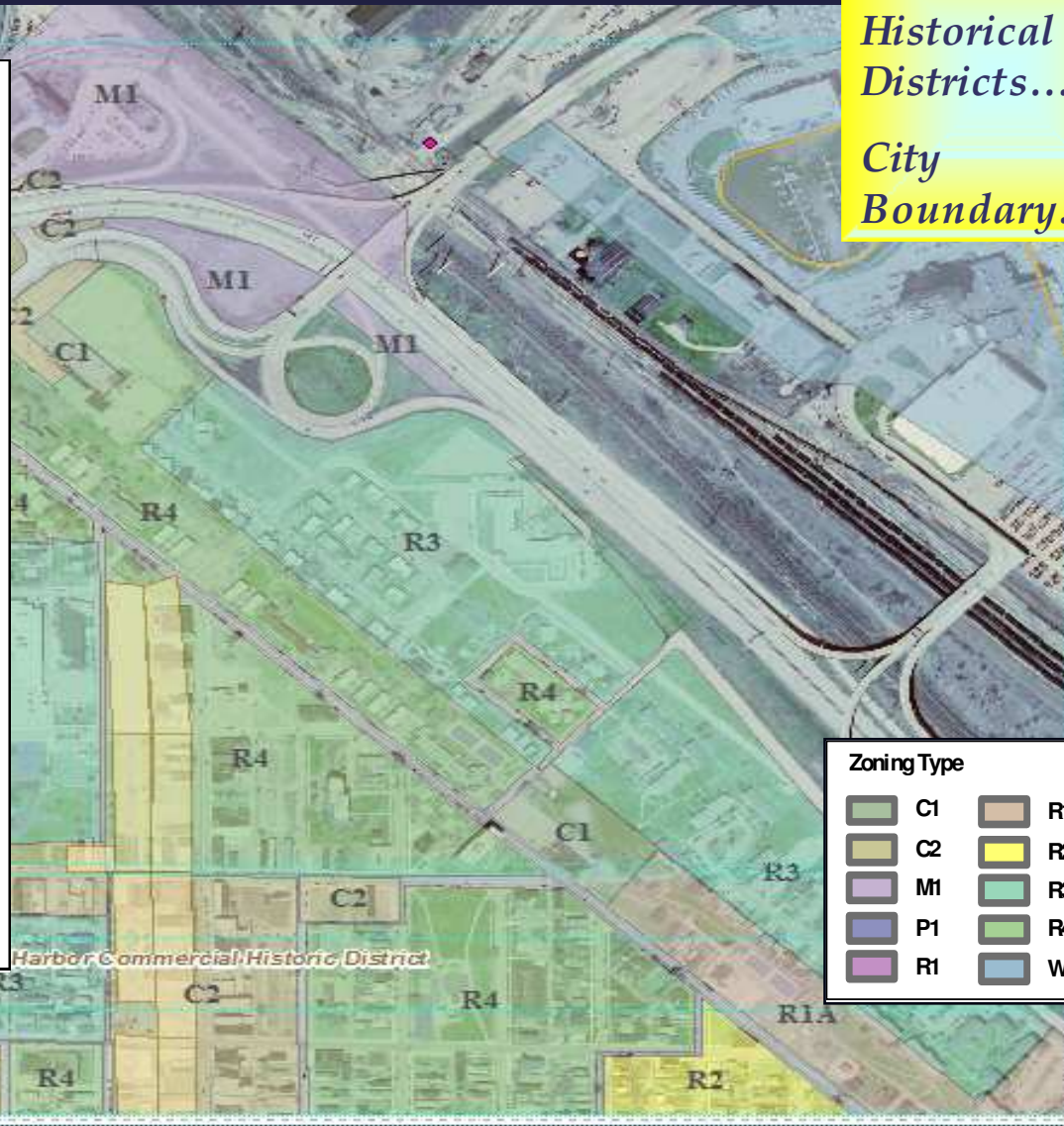
Sewer.....

Conduit.....

# ArcView Base Map (polygons)

## BOUNDARY

-  EC City Limit
-  Gary City Limit
-  Historical District
-  Control Points
-  Section Corners
-  Section Township Range
-  Lake County Index
-  SPW Tiles
-  IN Zip Codes
-  LakeCo Census Tracts
-  Census\_Blocks
-  IN Minor Civil Divisions
-  Lake County
-  IN Counties
-  EC\_tiles



Zoning....

Historical  
Districts.....

City  
Boundary.....

## Zoning Type

 C1	 R1a
 C2	 R2
 M1	 R3
 P1	 R4
 R1	 WD-1

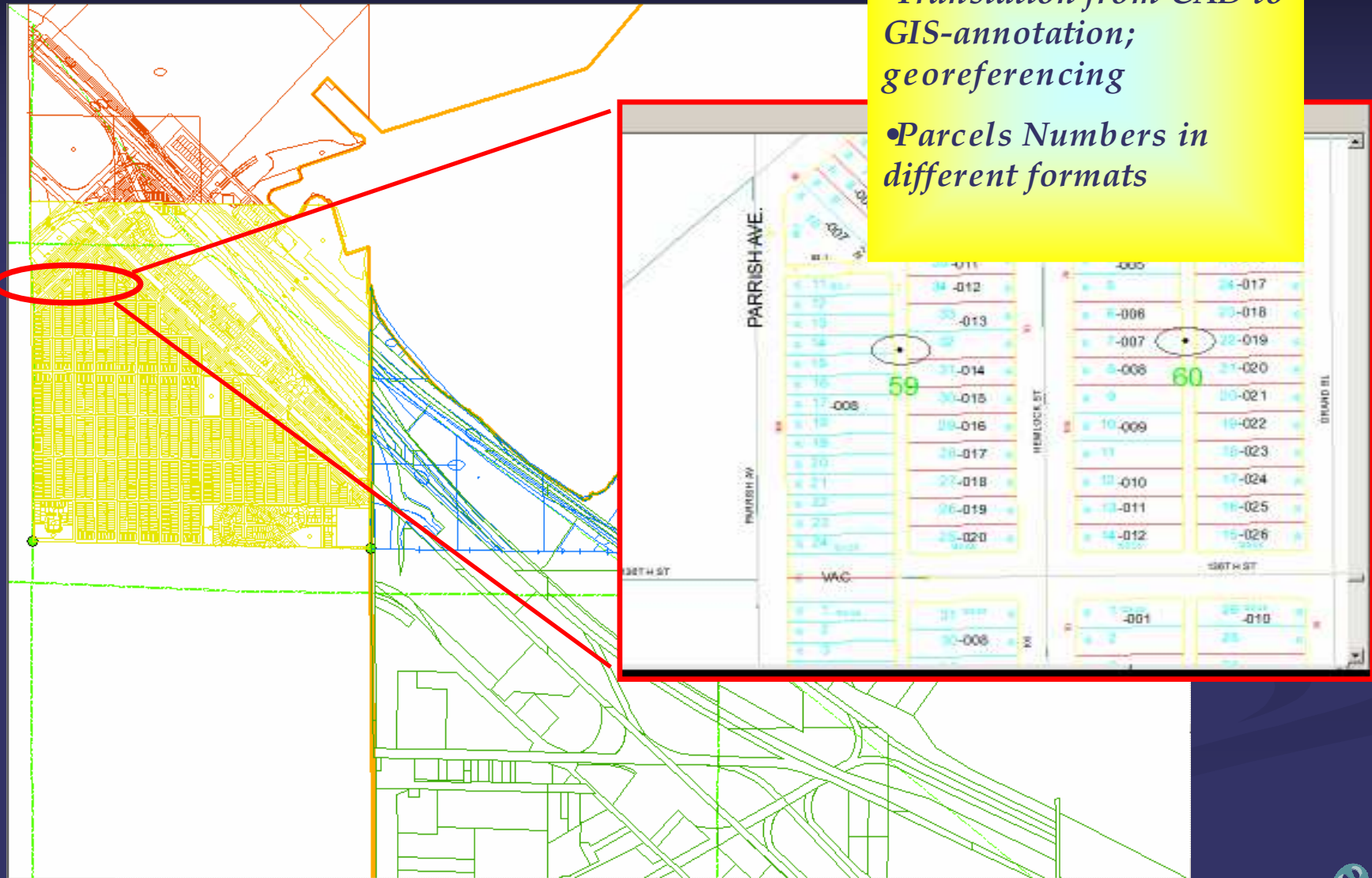


# Metadata for Data Layers

- Type
- Source
- Data Year
- Metadata Source
- Min. Scale in Map
- Max. Scale in Map
- New Name
- Original Name
- Contents/Quality
- Shape Type Rank
- Recommend Use
- Primary Display Field

Definition	Source	Type	Data Yr	Metadata	Min. Scale (Out Beyond)			
Section, Township, Range	IGS GIS Atlas for IN 083107 (via IDEM)	Boundary	?	M	70,000			
States	ESRI data, Nashville Server 2007	Boundary	2001	A	5,000,000			
Zoning	Kevin Miller of IDEM 091807	Boundary	?	M	144000			
Census Blocks	ESRI data, Nashville Server 2007	Demographics	2000; 2002	A	70,000			
Census-Ancestry/Ethnicity	IGS GIS Atlas for IN 083107 (via IDEM)	Demographics	1890-2000	M*	5,000,000	70000	IN_Census_MCD_Ancestry	Ethnicity_IN
Census_Population Changes	IGS GIS Atlas for IN 083107 (via IDEM)	Demographics	1890-2000	M*	5,000,000	70000	IN_Census_MCD_PopChange	Census_MCD_PopChange_IN
Census-Children_Poverty	IGS GIS Atlas for IN 083107 (via IDEM)	Demographics	2000; updated 2006	M*	5,000,000	70000	IN_Children_Poverty	Children_Poverty_UB_IN
Counties	ESRI data, Nashville Server 2007	Demographics	1992-2002	A	5,000,000	1,000,000	IN_cty	IN_cty
Census-Minor Civil Divisions	IGS GIS Atlas for IN 083107 (via IDEM)	Demographics	2000	M*	5,000,000	70000	IN_Minor_Civil_Divisions	Minor_Civil_Divisions_IN

## *Parcels (in CAD) Present a Challenge...*





# Aerial Photography



- *Statewide 2005  
Orthos-great  
resolution*

- *Many tiles, large  
space requirements*

- *Not as up to date as  
Google imagery*

## *Viewer Critical Parameters:*

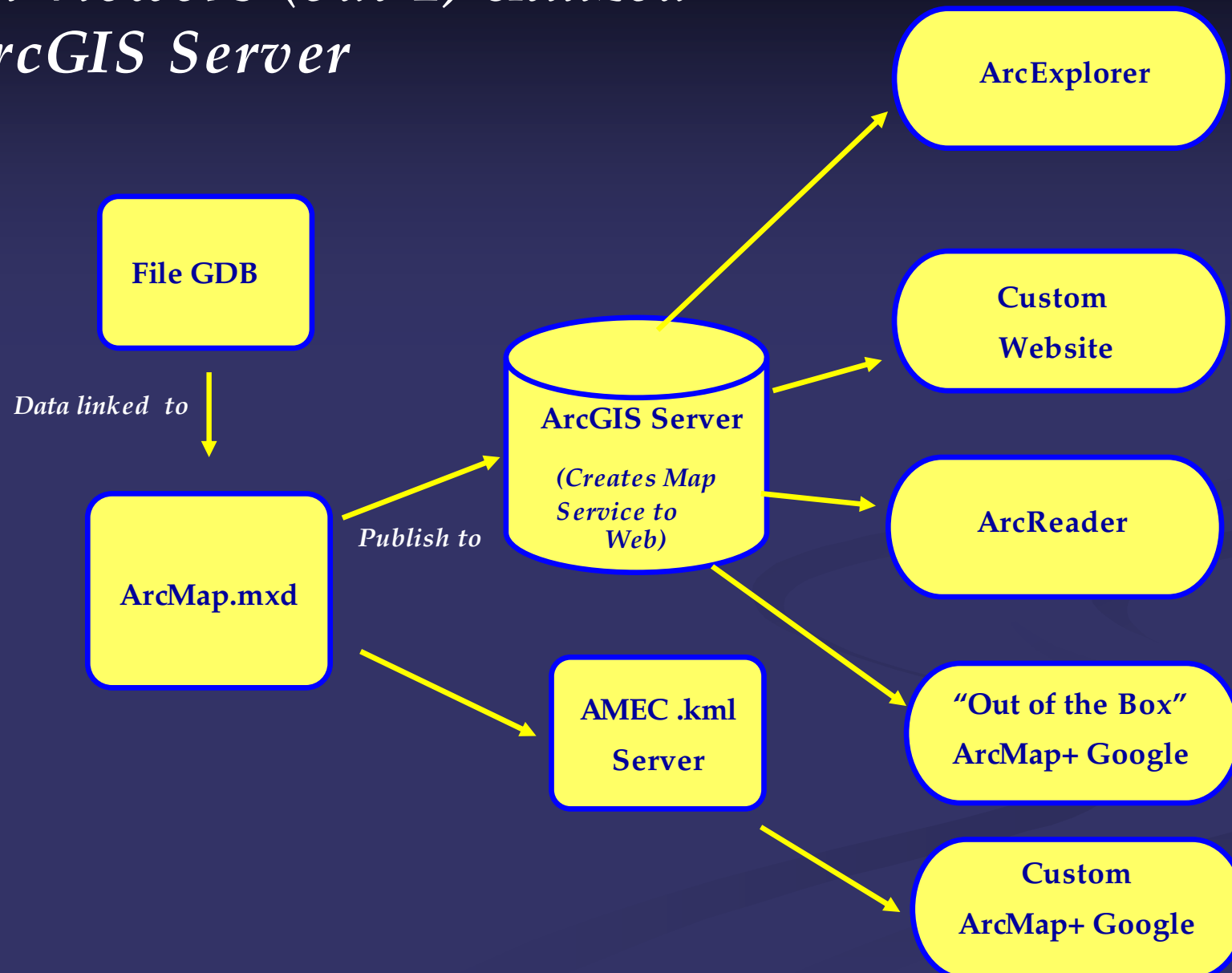
- Cost
- Easy to Use
- Available to wide audience
- Ability to see attributes
- Data centralization
- Ability to add Google “Sketch Up” (3 D) files
- Ability to add CAD files
- High resolution aerials
- Speed of loading, refresh, zoom
- Expandability
- Printing
- Controlled access



## *Data Viewers Evaluated :*

1. ESRI ArcExplorer
2. ESRI ArcReader
3. Custom ArcMap+Google Earth
4. Custom Website
5. AccuGlobe

## *All Viewers (but 1) Utilized ArcGIS Server*





# *1. ArcExplorer*

# ArcExplorer --Limitations

Retains map  
Symbology, but  
Not map Labels

"Buggy"

Very Slow &  
Pixelated





# *ArcExplorer*

## Features

- Free
- Compatible with ArcMap
- **Can add 3D**
- Same layer structure as ArcMap
- Many functions

## Limitations

- Very slow
- Uses File gdb, not Personal gdb
- Quirky in ArcGIS Server

## *2. ArcReader*

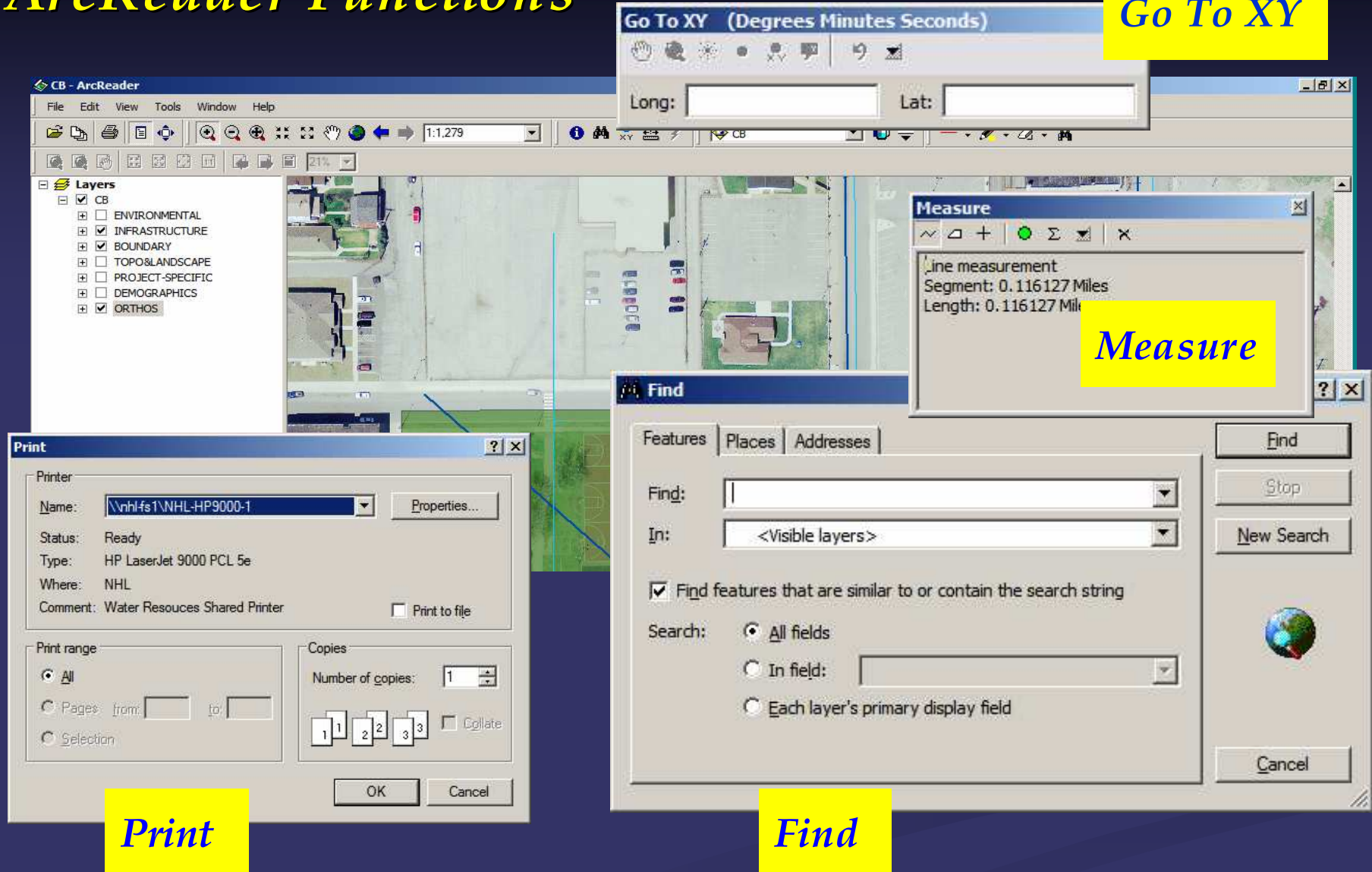
# *ArcReader--Features*

- Free to users
- **Can create with central data source (link to server)**
- Can control access/protect data (ArcGIS Server)
- Can view, explore, and print ArcGIS maps
- Can zoom, pan, identify, find, measure, magnify, hyperlink
- Looks like and is organized the same as ArcGIS base map
- Has same labels and symbols as ArcGIS base map
- Can see scales of layers
- Can see all attributes, and ID features in the map
- Can change units in map
- Can print to scale
- Can see multiple features simultaneously
- Can make direct highlights



# ArcReader Functions

*Go To XY*

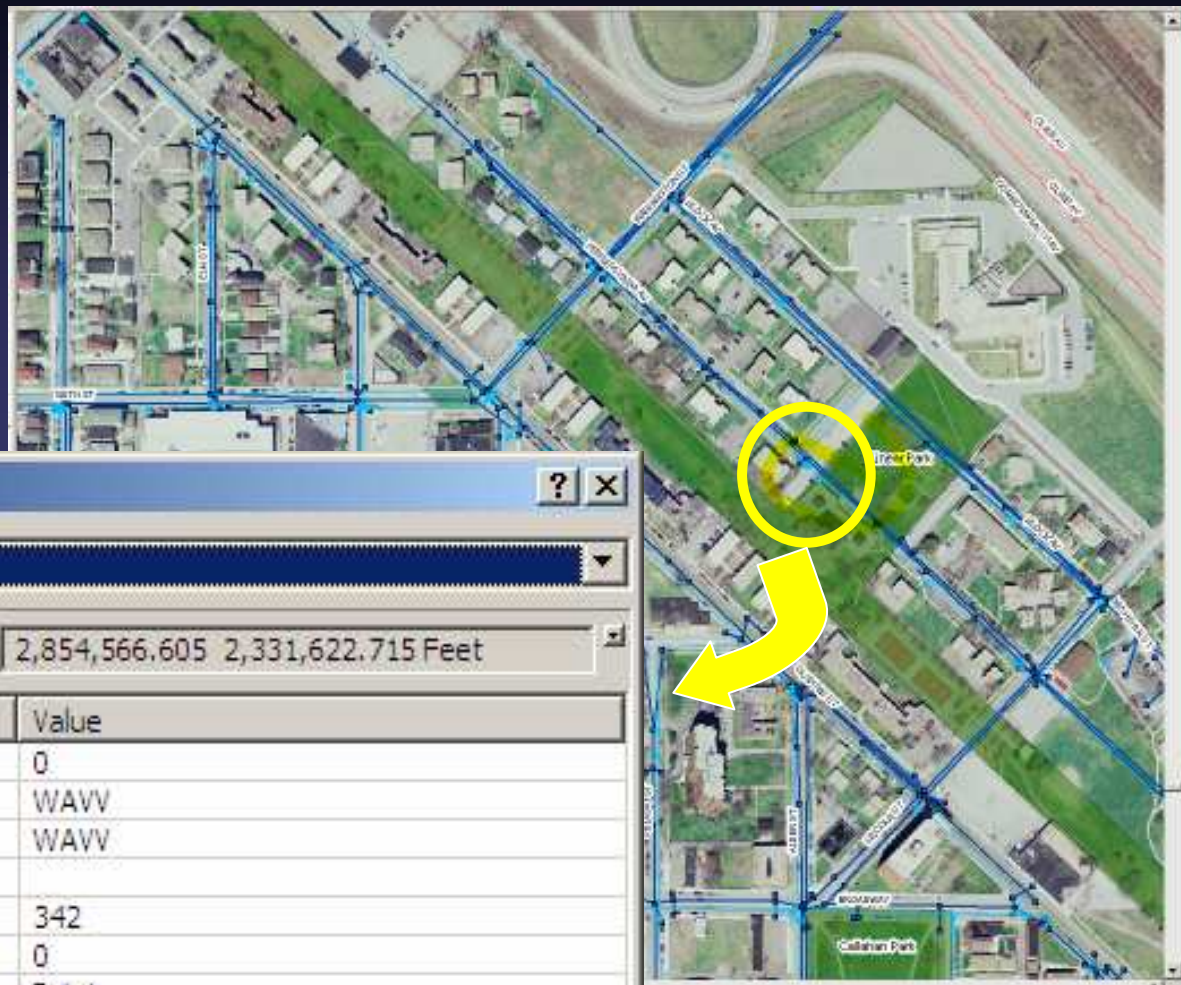


*Print*

*Find*

# ArcReader Functions

*Identify*



**i Identify** [?] [X]

Identify from: <Top-most layer>

☒ EC\_Water Valve

- 929
- 928

Location: 2,854,566.605 2,331,622.715 Feet

Field	Value
AREA	0
CODE	WAVV
NAME	WAVV
NUM	
OBJECTID	342
PERIMETER	0
Shape	Point
TYPE	2
WATER_6_29	929
WATER_6_30	202
X_COORD	2854566.6
Y_COORD	2331621.3

Identified 2 features

*Can See & Search Attributes*



# ArcReader--Limitations

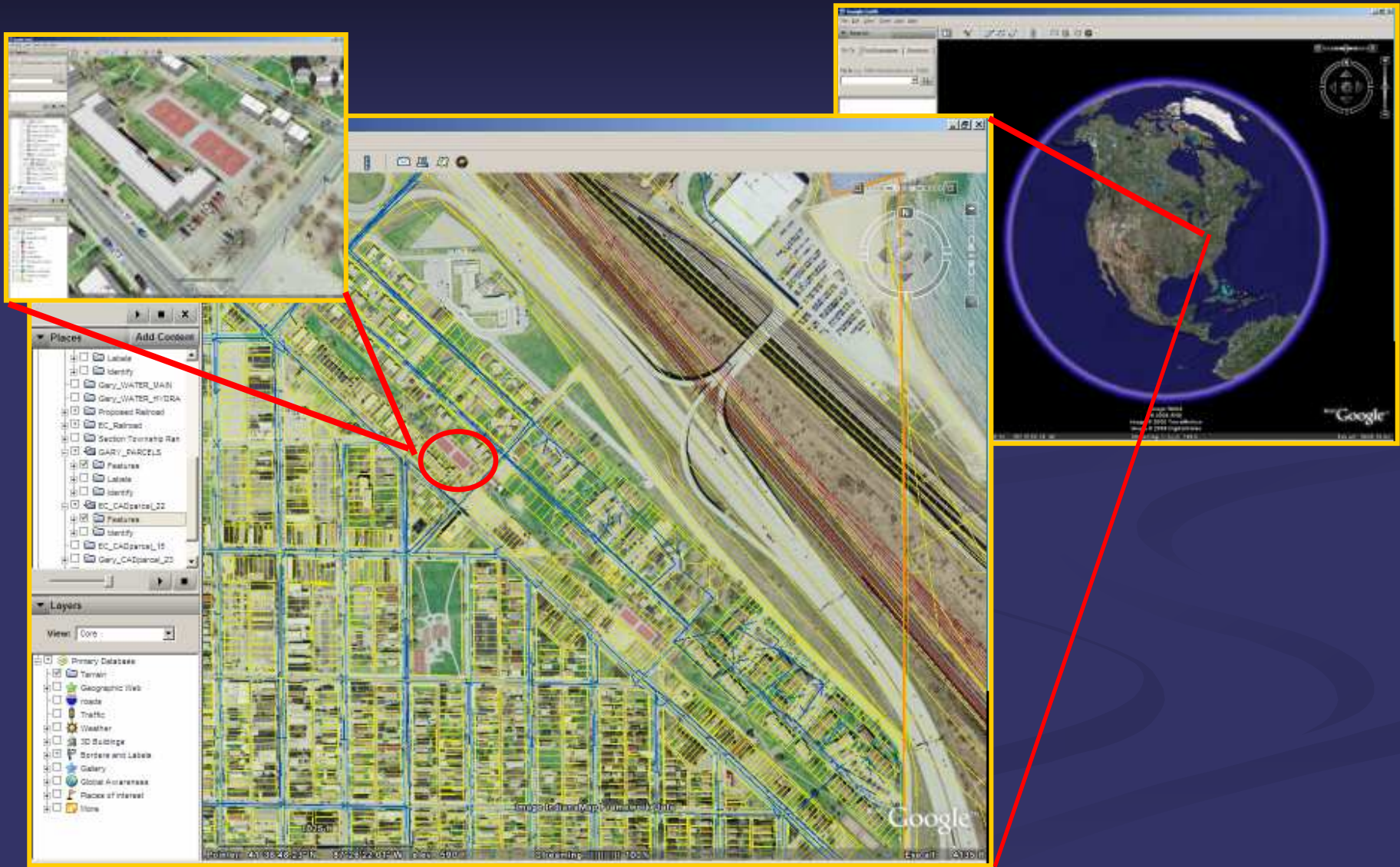


- User cannot edit data
- ArcPublisher \$2,000
- Not entirely dynamic--have to publish new .pmfs when changes made to layout
- Lower resolution imagery than Google Earth
- Slow to add initially; can be slow to refresh
- Speed depends on configuration of local machine and type of connection



### *3. ESRI ArcMap + Google Earth*

# ArcMap + Google Earth



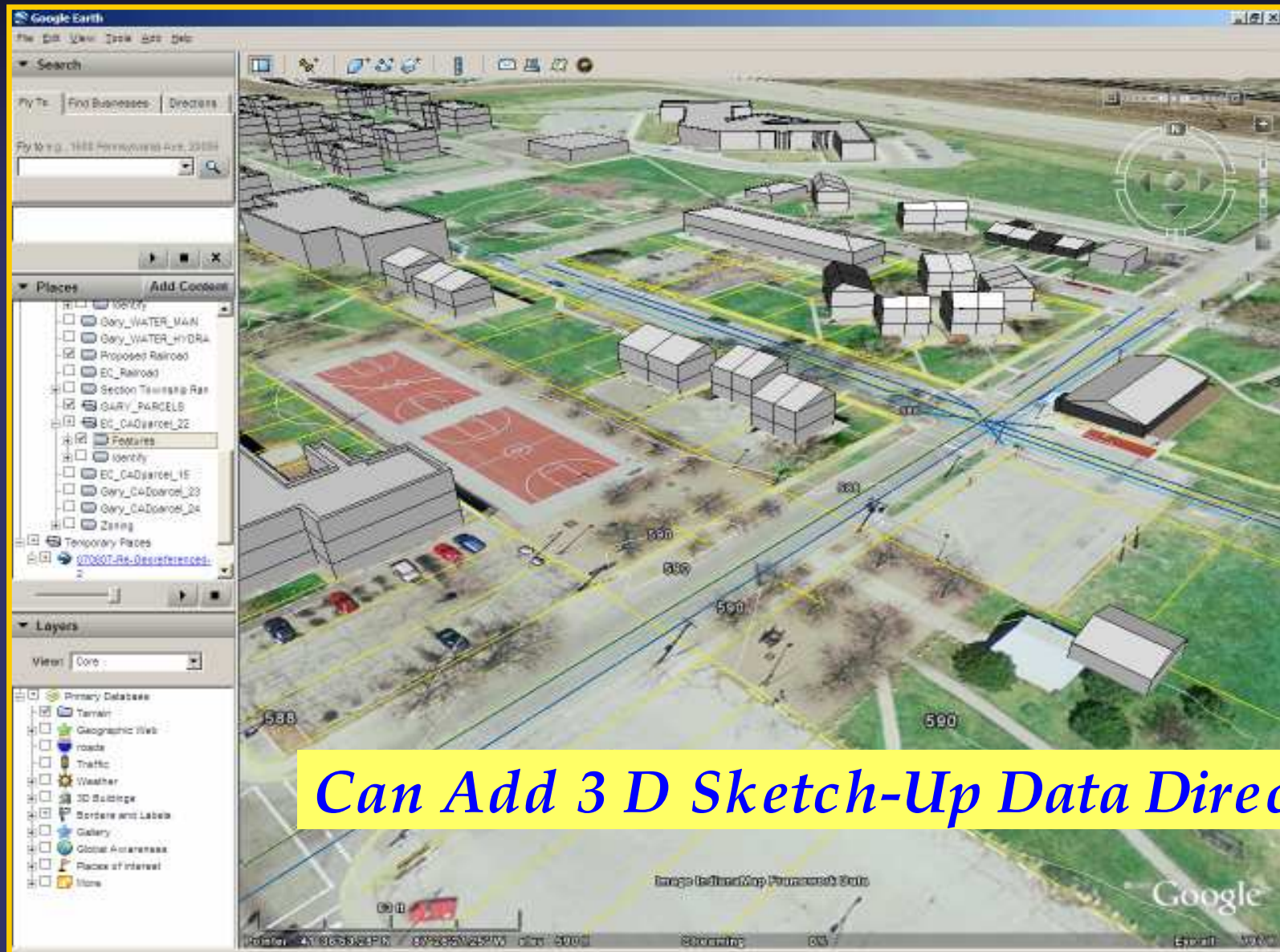
# *ArcMap+Google Earth--Features\**

- Can directly add 3D Sketch-Up files
- Centralized data source
- High quality, up-to-date imagery
- Anyone can access through Internet
- Uses lat/long
- SP4 –can see attributes based on Object ID
- Can add CAD via source .mxd (and maybe directly?)

*\* non-developer version*



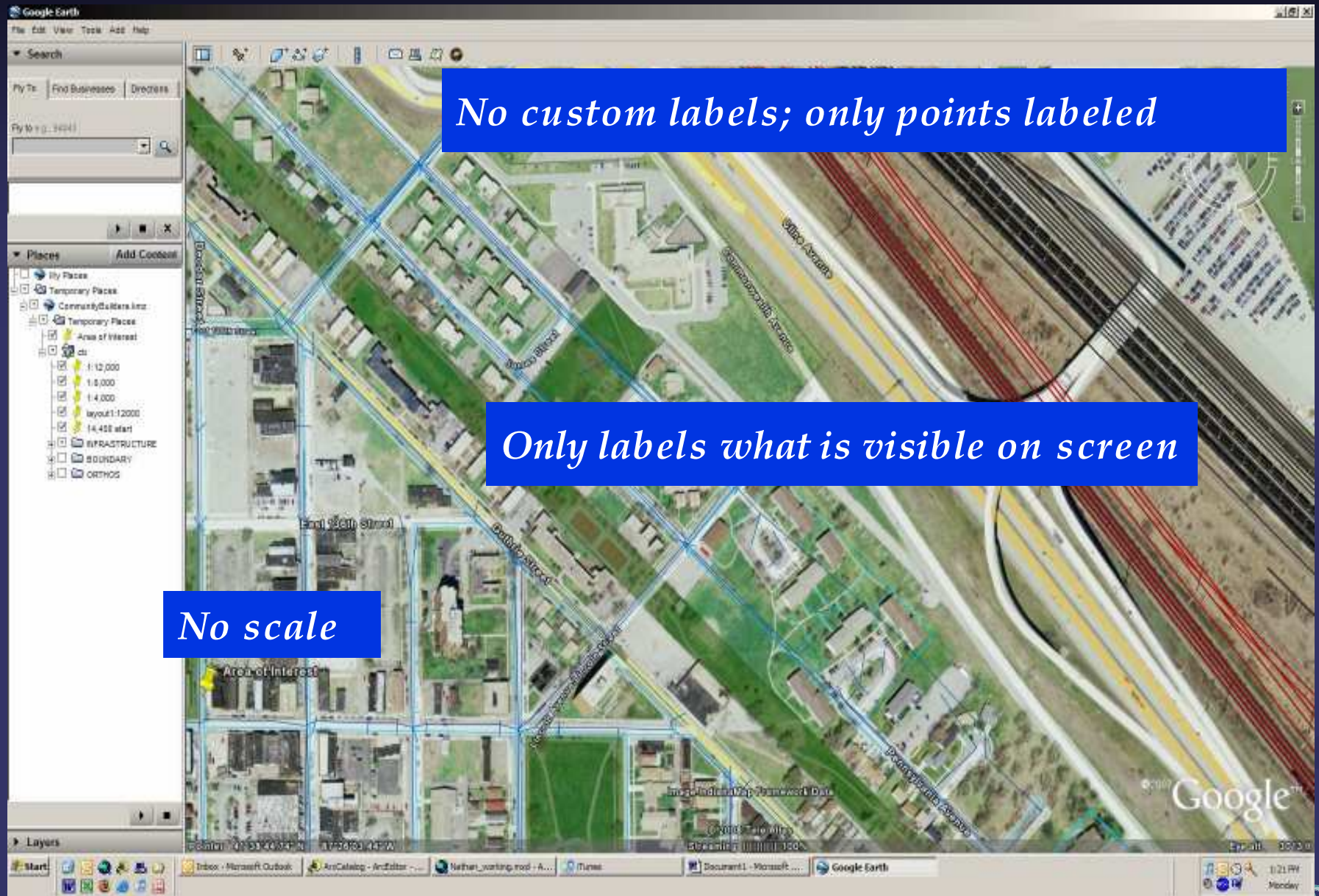
# ArcMap+Google Earth Functions



*Can Add 3 D Sketch-Up Data Directly*

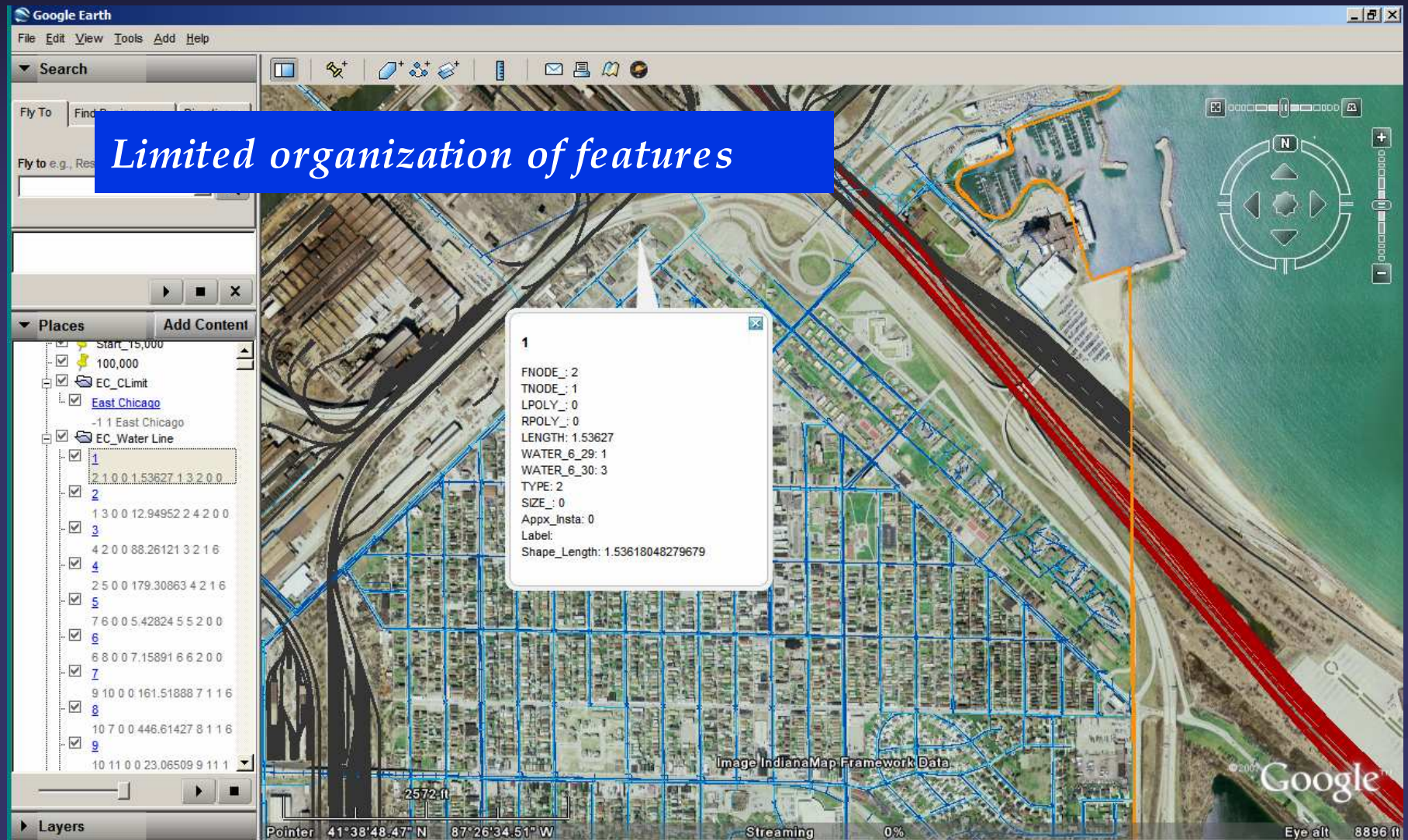


# ESRI ArcMap+Google Earth ("Out of the Box") --Limitations





# ArcMap + Google Earth--Limitations





# *ArcMap+Google Earth--Customized*

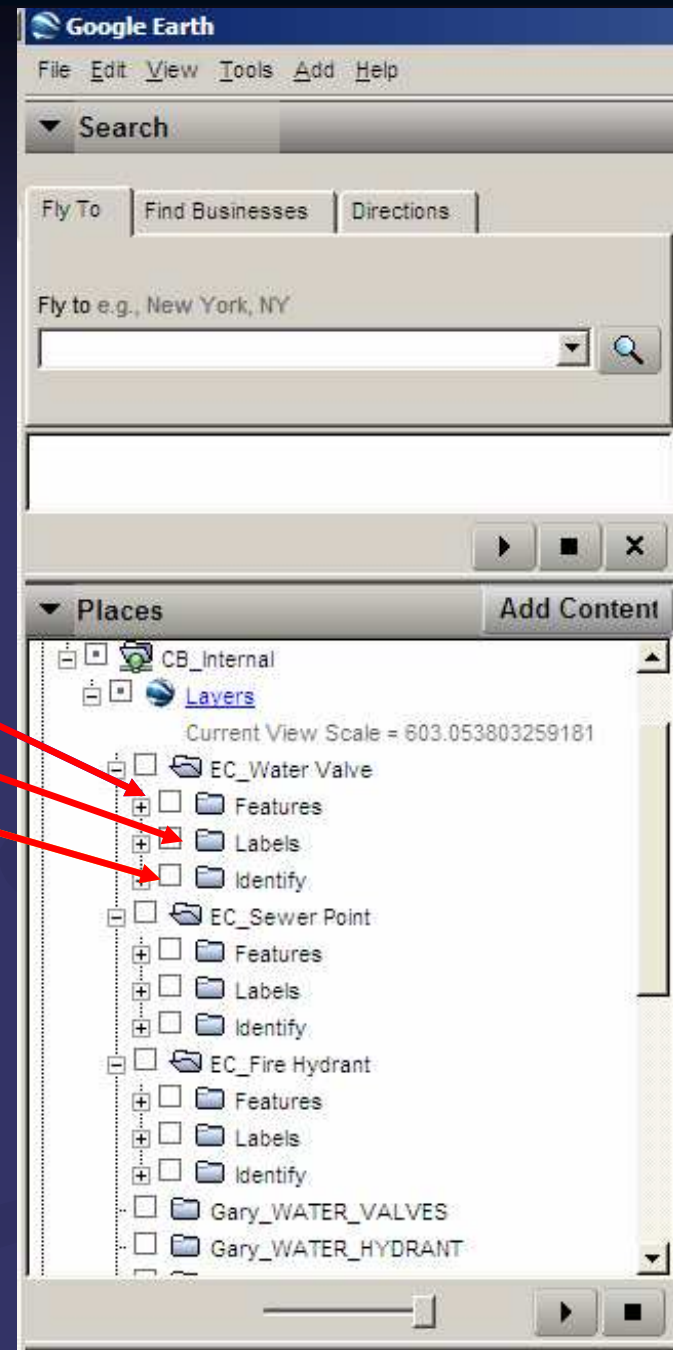
- AMEC programmed in C#, .NET
- Projects on the fly
- Added attribute viewing
- Advanced label functions
- Created 3 folders-show features only or with labels
- Can view all labels (not just what is visible)
- “Out of range message”



# ArcMap+Google Earth -- Customized

Programmed to create 3  
folders for each data layer:

- Features
- Labels
- Identify



# ArcMap+Google Earth (Custom)-- Features

The screenshot displays the Google Earth interface with a satellite view of a property. A yellow line indicates a boundary, and a white line points to a specific location. A data table is overlaid on the right side of the map, showing various attributes for the selected feature.

OBJECTID	10200
ID	10200
KEY_	254001730003
AREA	10.00
PERIMETER	4178.2
X_COORDINA	2057635
Y_COORDINA	2538833
Shape_Leng	4178.10000440
OBJECTID_1	8023
TaxCode	25
PropNum	254001730003
PropType	00000
PropSubTyp	10000
DeedOwner	Indiana, State of
OwnerName	Indiana, State of
OwnerAddr	100 N Senate Ave
OwnerCity	Indianapolis
OwnerState	IN
OwnerZip	46204
LegalDesc	PT W/2 SW1/4 S.23 T.37 R.5 LYING BETWEEN CSX & CONRAIL (CLINE AVE R/W) 0.6324C
LocationAd	400 N Maine Lakeside
LocationC	Gary
LocationSt	IN
LocationZ	46400
LocationDe	N/A
Resident	0000000000
NonResident	0000007500
RealProp	0000000000
NonRealProp	0000000000
NetAcqVal	0000000000
PropClassC	010
TaxSaleOrd	00000
ExtinctCat	01/20/2005

*Can Identify Attributes*

# *ArcMap+Google Earth--Limitations*

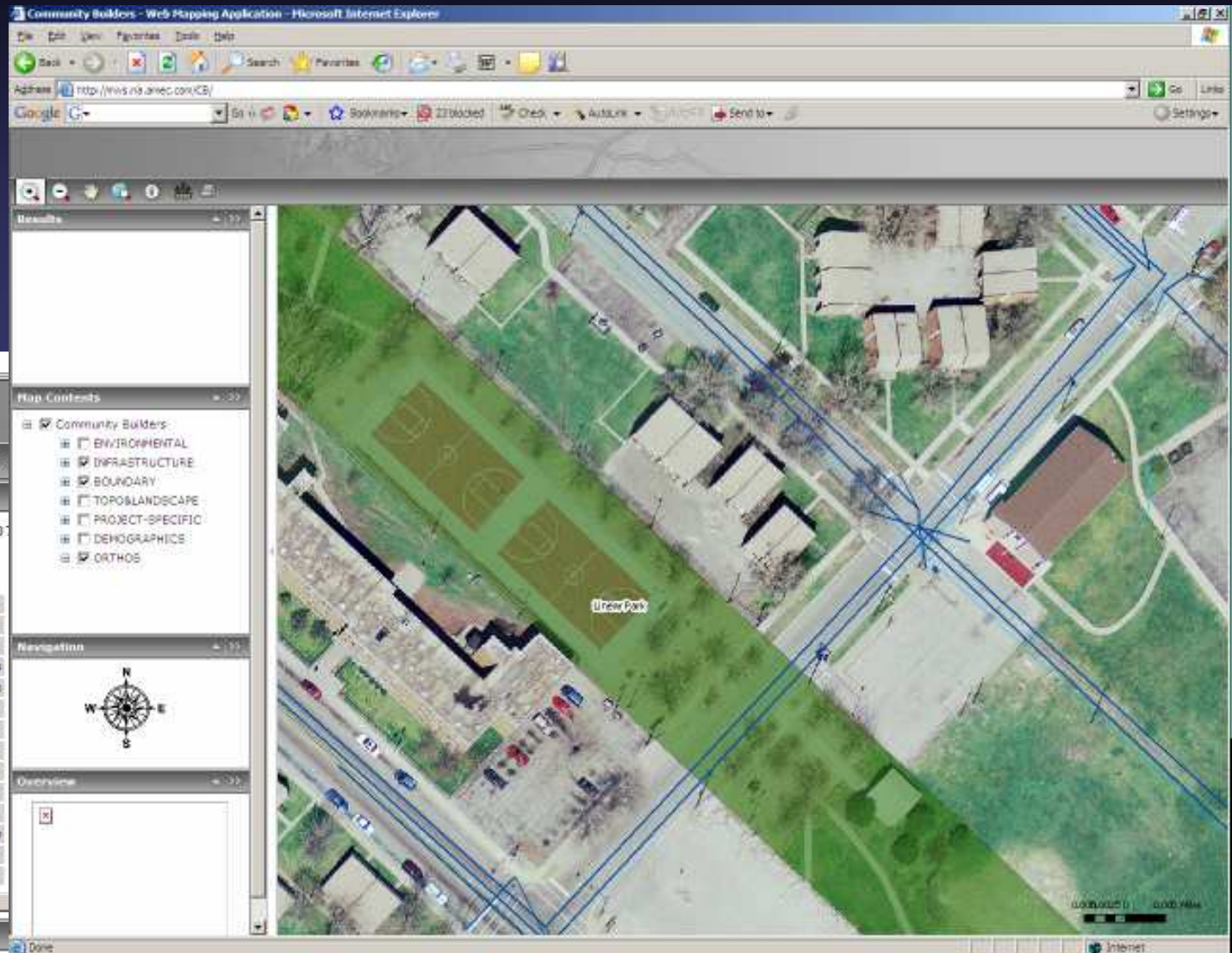
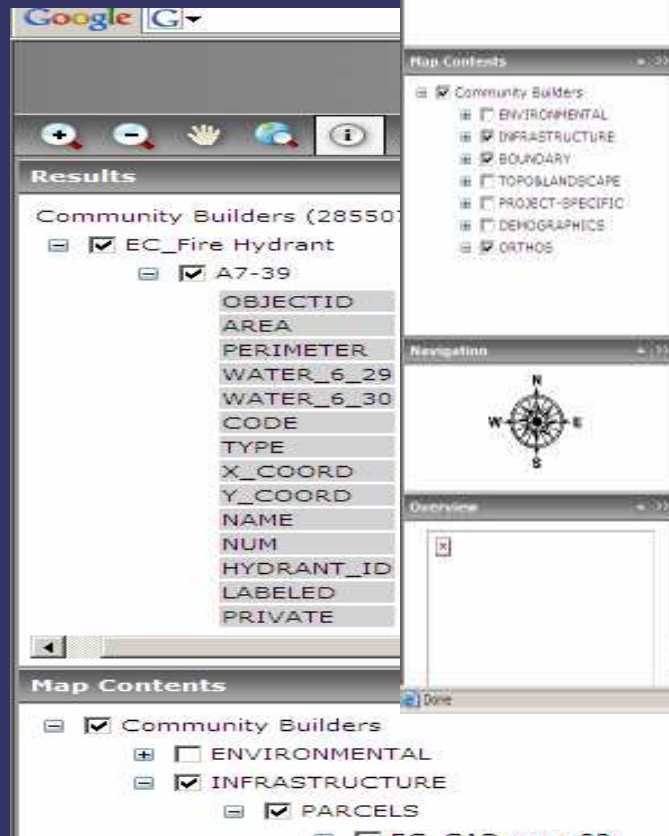
- Professional license \$400
- Can be very slow--subject to limitations in individual's PC and Internet connection
- Does not allow for advanced labeling
- Cannot easily see data attributes; folders are awkward
- Does not allow for printing to scale



## *4. Custom Website*

# Custom Website

*Very fast  
because  
data are  
centralized  
on server*



*Shows all layers and attributes;  
can expand to many functions*

## *Custom Website--Features*

- Faster than other solutions
- Completely expandable to many new functions
- Can click on map and view attributes
- Retains labels and symbology from base map
- No software necessary, only Internet connection needed
- Centralized data
- **Can add levels of security**



## *Custom Website--Limitations*

- Requires programming/custom development
- Cannot add 3D files
- Requires cost for hosting & maintenance

## *5. AccuGlobe*

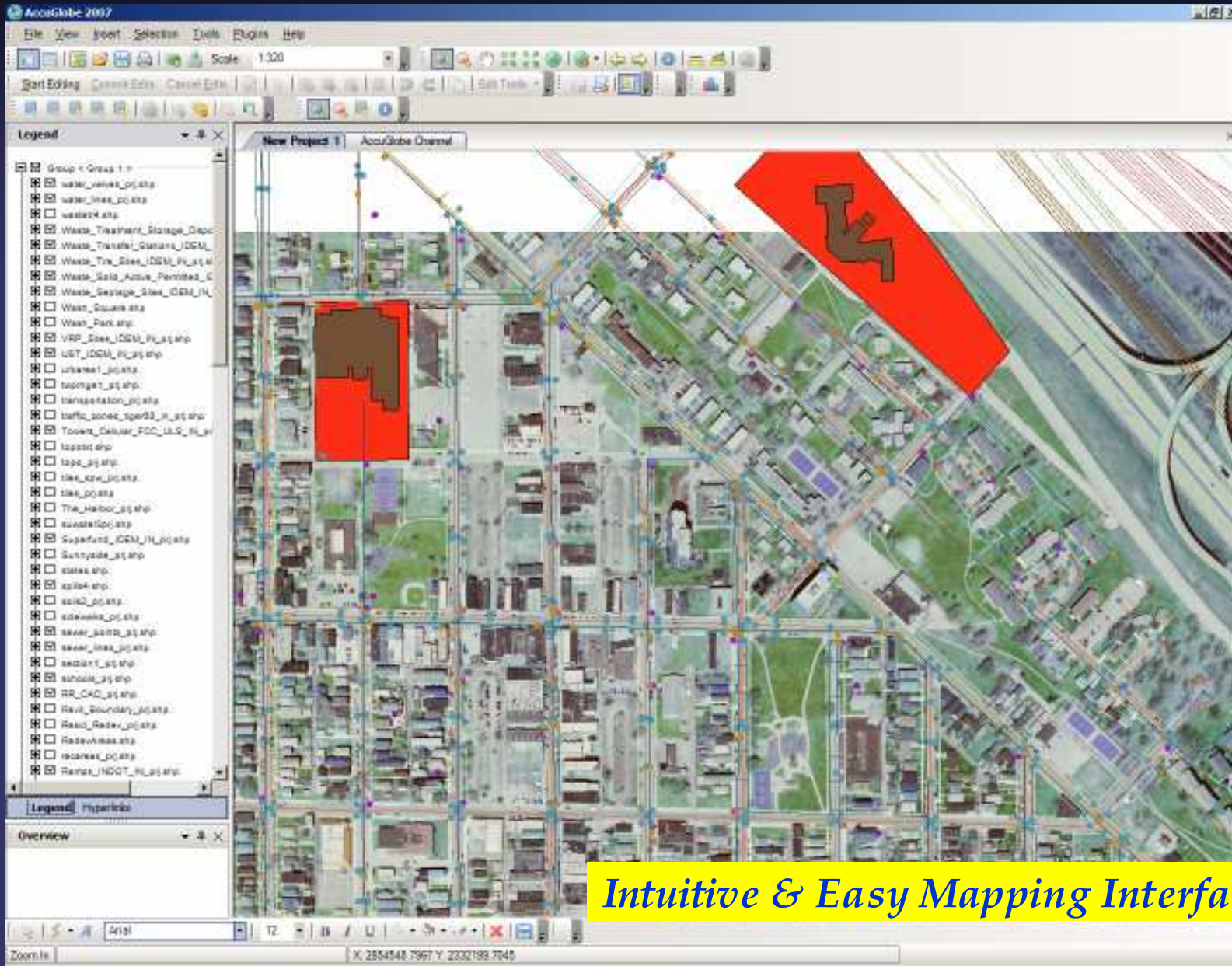
# AccuGlobe

- *Developed by Digital Data Technologies, Inc. (ddti)*
- *Linked to IN Spatial Data Portal*
- *Distributed widely in Midwest*





## AccuGlobe--Features



### Intuitive & Easy Mapping Interface

## *AccuGlobe Formats Supported:*

### Vectors:

- .shp
- .mdb

### Rasters:

- MrSID
- .tiff
- .bil
- .gif
- .jpg
- .lan
- .png
- .bmp

### Misc.:

- .txt
- .ecw

## *Not Supported:*

- File GDB
- CAD
- Sketch Up, .kml
- SID > 50 mb
- Compressed SID

# AccuGlobe

Attribute Table (spills4.shp)

FID	Geometry	OBJECTID	FACILITY_I	FACILITY_N	FACILITY_A	CITY	ZIP_CODE	RCRA_ID	SOLIDWASID	TRIS	UST	LUST	SPILLS	CRTK	LANDUSE	PCS	AIR	X_COORD	Y_COORD
1	Point (1 part, 1 point)	1	IND16105693	BLOCKSON B	400 CENTER S	MICH	48360	IND161056					UST	SPILL9	CRTK9			502778.812	46191
2	Point (1 part, 1 point)	2	IND00515954	CRITERSON CA	1800 E US 12	MICH	48360												
3	Point (1 part, 1 point)	3	IND001652001	ANDERSON CO	402 ROYAL RD	MICH	48360												
4	Point (1 part, 1 point)	4	IND98178741	MCHISAN CT	1623 GREENW	MICH	48360												
5	Point (1 part, 1 point)	5	IND001652007	SCHMUCK OIL	1111 W GARP	MICH	48360												
6	Point (1 part, 1 point)	6	IND99487821	AMERICAN WA	1100 INDIANA	HAM	46360												
7	Point (1 part, 1 point)	7	IND00174082	LEVER BROTH	1200 CALUME	HAM	46360												
8	Point (1 part, 1 point)	8	IND00546260	INDIANA HAR	3001 DICKEY	EAST	46360												
9	Point (1 part, 1 point)	9	IND007437558	AMERICAN OIL	2815 INDIANA	WHIT	46360												
10	Point (1 part, 1 point)	10	IND08207123	FERRI CORP	3000 SHEFFIE	HAM	46360												
11	Point (1 part, 1 point)	11	IND15066637	DAHLIN TRAN	640 131ST PL	HAM	46360												
12	Point (1 part, 1 point)	12	IND98497273	HARSCO CORP	3210 WATLIN	EAST	46360												

Table Design (spills4.shp)

Name	Data	Length	Decimals Places	Attribute Index	Hidden
OBJECTID	Integer	9		<input type="checkbox"/>	<input type="checkbox"/>
FACILITY_I	Char	12		<input type="checkbox"/>	<input type="checkbox"/>
FACILITY_N	Char	50		<input type="checkbox"/>	<input type="checkbox"/>
FACILITY_A	Char	50		<input type="checkbox"/>	<input type="checkbox"/>
CITY	Char	30		<input type="checkbox"/>	<input type="checkbox"/>
ZIP_CODE	Char	9		<input type="checkbox"/>	<input type="checkbox"/>
RCRA_ID	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
SOLIDWASID	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
TRIS	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
UST	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
LUST	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
SPILLS	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
CRTK	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
LANDUSE	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
PCS	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
AIR	Char	16		<input type="checkbox"/>	<input type="checkbox"/>
X_COORD	Float	19	11	<input type="checkbox"/>	<input type="checkbox"/>
Y_COORD	Float	19	11	<input type="checkbox"/>	<input type="checkbox"/>

Structure Editor

Data Fields In Layer

OBJECTID  
FACILITY\_I  
FACILITY\_N  
FACILITY\_A  
CITY  
ZIP\_CODE  
RCRA\_ID  
SOLIDWASID  
TRIS  
UST  
LUST  
SPILLS  
CRTK  
LANDUSE  
PCS  
AIR  
X\_COORD  
Y\_COORD

Move

Top [icon]  
Up [icon]  
Down [icon]  
Bottom [icon]

Add [icon]  
Remove [icon]  
Rename [icon]

Type  
Length  
Decimal Places

Please Note:  
Converting between incompatible data types will result in loss of data.

Commit [icon]  
Cancel [icon]

Easy & Powerful Editing Functions

Copy To Clipboard [icon]

Add [icon]

Remove [icon]

Structure Editor [icon]

Close [icon]



# AccuGlobe

## Advantages

- Free
- All common map functions
- Powerful labeling, symbology functions
- Query, Relates, Merge
- Advanced printing
- Can create charts
- **Advanced editing**
- Automated updates to software
- Numerous custom extensions

## Limitations

- Limited size for images (50 mb for .tiffs)
- Cannot add File gdb format
- Cannot add CAD or 3D
- Local (not centralized) data source

Criterion	ArcReader	ArcExplorer	ArcMap+ Google Earth	Custom Website	AccuGlobe
Cost		✓			✓
Easy to Use	✓			✓	✓
View Attributes	✓			✓	✓
Centralized Data & Dynamic	✓	✓	✓	✓	
Editing					(✓)
Image Resolution			✓		
Speed				✓	✓
Expandability	✓		✓	✓	
Add 3D		✓	✓		
Add CAD	✓				
Printing	✓				✓
Security	✓			✓	

# Created Dashboard to Deliver Data & Help

## SouthShore Redevelopment Project, East Chicago/Gary, IN Viewer & Mapping Support



The Community Builders, Inc.

There are 2 viewers and supporting software for the project: (1) is a **GIS-based (ESRI ArcView)** map with detailed symbology and information on attributes (there are 2 versions-one with aerial photos, and one without, which takes up less space and is faster); (2) is a **Google-based map** with limited layers for viewing 3D Sketch-Up files.

To download the files, right click on link ("Select" buttons), then select "Save Target As", and copy to your local computer. If the files are zipped (xxx.zip), right click on zip file name, and select "Extract Here" to place unzipped file on your computer. Minimum computer System Requirements are given below.

### (1) Base Map (ArcReader)

#### ► Select Base Map Software and Download

(path N:\034678250\_TheCommunity\_Builders\Viewers\ArcReader92.zip)

#### ► Select Base Map Viewer and Download

(path N:\034678250\_TheCommunity\_Builders\Viewers\CB.pdf)

#### ► Select Compressed Base Map Viewer and Download

(path N:\034678250\_TheCommunity\_Builders\Viewers\CB\_Compressed.pdf)

#### ► Select Software Help/Instructions

(path N:\034678250\_TheCommunity\_Builders\Viewers\ArcReader\_Tutorial.pdf)

#### ► Select Quick Start Software Help/Instructions

(path N:\034678250\_TheCommunity\_Builders\Viewers\arcreader-quickstart-tutorial.zip)

#### ► System Requirements-**READ ME FIRST**

(path N:\034678250\_TheCommunity\_Builders\Viewers\ArcReader\_Requirements.doc)

### (2) 3D Viewer (ArcMap+GoogleEarth)

#### ► Select 3D Viewer Software and Download

(path N:\034678250\_TheCommunity\_Builders\Viewers\Google\_Earth\_BZXD.exe)

#### ► Select 3D Viewer and Download (just download & open in GoogleEarth)

(path N:\034678250\_TheCommunity\_Builders\Viewers\CommunityBuildersExternal.kmz)

#### ► Select Specific Software Help/Instructions

(path N:\034678250\_TheCommunity\_Builders\Viewers\GoogleBaseMapHelp.pdf)

#### ► Select GoogleEarth Help/Instructions (just copy & paste into browser)

(path <http://earth.google.com/userguide/v4/>)

#### ► Report an Error or Problem



## On the Horizon.....

- Migrate data to SDE
- Compression of aerials for .pmf
- Network Links for ArcMap+Google Earth
- Export .kml from Microstation?
- Image Server ?
- Virtual Earth with 9.3 ??



# Conclusions

- No single solution was adequate for project needs
- Delivered ArcReader for 2D and the Customized ArcMap+Google Earth (with fewer layers) for 3D
- Technology in state of development
- Prioritizing criteria is essential